

App. No. 09/274,194

required under 37 C.F.R. 1.111, as all remaining claims are new, no "Marked-Up Claims" need to be submitted with this Preliminary Amendment.

Please delete claims 1-19 and add new claims 20-38.

5

1 20. (New) A method of removing photoresist material from surfaces

formed on a semiconductor substrate, comprising:

providing a semiconductor substrate;

forming a low dielectric constant layer on a surface of the semiconductor  
substrate;

forming a hard mask layer over the low dielectric constant layer;

forming a photoresist layer over the hard mask layer;

forming an opening in the hard mask layer exposing the low dielectric constant  
layer; and

removing the photoresist layer from over the hard mask layer with dimethyl  
sulfoxide of a high pressure liquid chromatography (HPLC) grade,

wherein a high selectivity of the dimethyl sulfoxide of HPLC grade toward a low  
dielectric constant material of the low dielectric constant layer causes the dimethyl  
sulfoxide of the HPLC grade to chemically dissolve the photoresist layer from over the  
hard mask layer without substantially damaging the low dielectric constant layer.

1  
2 21. (New) The method of claim 20, wherein the low dielectric constant  
material has a dielectric constant of about 3.0 or less.

1  
25 3 22. (New) The method of claim 20, wherein the low dielectric constant  
material has a dielectric constant in a range from approximately about 1.5 to  
approximately about 3.0.

App. No. 09/274,194

4 23. (New) The method of claim 20, wherein the semiconductor substrate is held in an ultrasonic bath.

5 24. (New) The method of claim 23, wherein the ultrasonic bath is heated to at least approximately about 50 °C.

6 25. (New) The method of claim 24, wherein the semiconductor substrate is held in the ultrasonic bath for a period not longer than about 5 minutes.

10 7 26. (New) A method of removing photoresist material, comprising:  
providing a semiconductor substrate;  
forming a low dielectric constant layer on a surface of the semiconductor substrate;  
forming a hard mask layer over the low dielectric constant layer;  
15 forming a photoresist layer over the hard mask layer;  
forming an opening in the hard mask layer using the photoresist layer; and  
removing the photoresist layer from over the hard mask layer using dimethyl sulfoxide, the dimethyl sulfoxide having high selectivity to the low dielectric constant layer such that the dimethyl sulfoxide chemically dissolves the photoresist without  
20 damaging the low dielectric constant layer exposed by the opening.

8 27. (New) The method of claim 26, wherein the photoresist layer is removed by subjecting the semiconductor substrate to dimethyl sulfoxide in liquid form.

App. No. 09/274,194

8

9 28. (New) The method of claim 27, wherein the photoresist layer is removed by subjecting the semiconductor substrate to dimethyl sulfoxide of a high pressure liquid chromatography (HPLC) grade.

7

5 10 29. (New) The method of claim 26, wherein the semiconductor substrate is held in an ultrasonic bath.

10

11 30. (New) The method of claim 29, wherein the ultrasonic bath is heated to at least approximately about 50 °C.

10

11

12 31. (New) The method of claim 30, wherein the semiconductor substrate is held in the ultrasonic bath for a period not longer than about 5 minutes.

7

13 32. (New) The method of claim 26, wherein the low dielectric constant layer has a dielectric constant of approximately about 3.0 or less.

7

14 33. (New) The method of claim 26, wherein the low dielectric constant layer has a dielectric constant in a range from approximately about 1.5 to approximately about 3.0.

20

15 34. (New) A method of forming a semiconductor device, comprising:  
forming a low dielectric constant layer;  
forming a hard mask layer over the low dielectric constant layer;  
forming a photoresist layer over the hard mask layer;  
25 patterning the photoresist layer;

App. No. 09/274,194

etching an opening in the hard mask layer using the patterned photoresist layer;  
and

removing the photoresist layer from over the hard mask layer with a high pressure  
liquid chromatography (HPLC) grade liquid held in an ultrasonic bath, the HPLC grade  
5 liquid having high selectivity toward the low dielectric constant layer thus dissolving the  
photoresist layer from over the hard mask layer without substantially damaging the low  
dielectric constant layer.

15  
16 35. (New) The method of claim 34, wherein the liquid of the HPLC grade  
10 is a form of dimethyl sulfoxide.

15  
17 36. (New) The method of claim 34, wherein the ultrasonic bath is heated  
to at least approximately about 50 °C.

17  
15 18 37. (New) The method of claim 36, wherein the semiconductor  
substrate is held in the ultrasonic bath for a period not longer than about 5 minutes.

15  
19 38. (New) The method of claim 34, wherein the low dielectric  
constant material has a dielectric constant of approximately about 3.0 or less.

20

### REMARKS

The Examiner is thanked for the careful review of this application. The present  
application is a continued prosecution application (CPA) filed under 37 CFR 1.53(d) of  
U.S. Patent Application Number 09/274,194, filed on March 22, 1999 (Parent  
25 Application). The Applicant hereby submits this Preliminary Amendment as a follow up